Space Weather Forecast

Issued on Sunday, 31 December 2023 at 13:15 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of Moderate flares. Slight chance Minor storms from coronal hole fast wind onset day 2 (1st Jan).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Low with occasional common class flares, the largest of which were from a new region that has rotated onto the east limb. The three numbered sunspots on the disc remained small and simple, with either a stable or declining trend. The new region is too close to the limb to accurately assess, but currently appears small, though comprised of a north-south aligned mixed polarity spot. A further small new region has also recently emerged on the northwest disc.

There were several coronal mass ejections (CME's) observed through the period, with most being analysed as likely missing Earth. This included a couple of eruptions off the northwest and southeast disc, although the most recent eruption, at 31/1030UTC, is awaiting further imagery for analysis. A further weak CME off the south of the disc was identified as likely coming from a subtle change the Sun's corona at around 31/0300 UTC. While relatively slow, faint, and mainly southward directed, a glancing impact cannot be ruled out and analysis is still ongoing

Solar Wind / Geomagnetic: Background wind speeds were observed with a declining trend, from around 350 km/s to bear 300 km/s. Interplanetary Magnetic Field (IMF) was generally weak. The north-south component was also weak and mainly positive (northward) until 31/0215 UTC, then mainly negative (southward). Geomagnetic activity remained Quiet (Kp 0-1).

Energetic Particles / Solar Radiation: Count rate of energetic particles (high energy protons) persisted at background, with no solar radiation storms occurring.

Four-Day Space Weather Forecast Summary

Solar Activity: Low activity is expected, but with a chance of rising to Moderate with isolated M-flares possible, especially later in the period when a returning region is likely to rotate onto the visible disc.

Solar Wind / Geomagnetic Activity: There are no Earth-directed CMEs within the forecast period. Slow wind conditions are expected until the arrival of the fast wind from a coronal hole feature. Elevated winds are forecast, around 500-550km/s, and likely persisting through day 3 (2nd Jan). Quiet geomagnetic activity at first, becoming Unsettled tomorrow with a chance of Active intervals and a slight chance of an isolated Minor Storm interval from the fast wind onset. Activity easing to Quiet with a chance of Unsettled intervals day 3 (3rd Jan) and then back to predominantly Quiet activity for day 4 (4th Jan).

Energetic Particles / Solar Radiation: Count rate of energetic particles (high energy protons) is expected to persist at background, with no solar radiation storms occurring.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

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Met Office Space Weather Forecast

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	5	20	5	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	55	50	45	40
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	2	2	2	2
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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